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# Results from an evaluation of tobacco control policies at the 2010 Shanghai World Expo

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## ABSTRACT

**Background** Large-scale international events such as World Expos and Olympic Games have the potential to strengthen smoke-free norms globally. The Shanghai 2010 World Expo was one of the first large-scale events to implement and evaluate the adoption of strict tobacco control policies.

**Objective** To evaluate implementation of tobacco control policies at the 2010 World Expo in Shanghai, China.

**Methods** This mixed methods evaluation was conducted from July to October 2010. Observations were conducted in all 155 pavilions and outdoor queuing areas, all 45 souvenir shops, a random sample of restaurants (51 of 119) and selected outdoor non-smoking areas in all sections of the Expo. In addition, intercept surveys were completed with 3022 visitors over a 4-month period.

**Results** All pavilions and souvenir shops were smoke-free. Restaurants were smoke-free, with only 0.1% of customers observed smoking. Smoking was more common in outdoor non-smoking areas, but still relatively rare overall with only 4.5% of visitors observed smoking. Tobacco products were not sold or marketed in any public settings except for three pavilions that had special exemptions from the policy. Overall, 80.3% of visitors were aware of the smoke-free policy at the World Expo, 92.5% of visitors supported the policy and 97.1% of visitors were satisfied with the smoke-free environment.

**Conclusions** Tobacco control policies at the World Expo sites were generally well-enforced and accepted although compliance was not 100%, particularly in outdoor non-smoking areas.

## INTRODUCTION

It is anticipated that, if current trends continue, tobacco will kill more than eight million people worldwide per year by 2030.<sup>1</sup> More than 50 years after the health dangers of smoking were documented and over 20 years since evidence confirmed the hazards of second-hand smoke, less than 5% of the world's population is protected by a comprehensive smoke-free policy.<sup>2</sup> Fortunately, numerous strategies have been shown to reduce tobacco use. The WHO organised international efforts to develop the WHO Framework Convention on Tobacco Control (FCTC)<sup>3</sup> which has achieved 168 signatories and over 150 parties. The FCTC outlines principles for developing policy, planning interventions and mobilising political and financial resources to accomplish tobacco control. Two critical elements of the FCTC are regulations regarding tobacco advertising and promotion and the implementation of smoke-free policies. Globally, the tobacco industry spends tens of billions of dollars

annually on advertising, promotion and sponsorship.<sup>4</sup> Comprehensive bans on advertising, promotion and sponsorship are effective in reducing rates of smoking across all income and educational levels.<sup>5</sup> Likewise, comprehensive smoking bans in public places are critical in reducing smoking prevalence and related morbidity and mortality.<sup>6</sup> A key step in the process of implementing legislation on smoke-free places is to gain public support through public education campaigns.<sup>7</sup>

While the FCTC has been an effective facilitator of tobacco control, there is a limited history of smoke-free events that host large masses of people such as World Expos and Olympics. World Expos are international fairs with corporate and national pavilions from a large number of countries. The FCTC officially took effect in China on 9 January 2006. The Shanghai 2010 World Expo, which lasted for 184 days and attracted more than 73 million visitors, was the first World Expo after the implementation of the FCTC. The theme of the Shanghai World Expo was 'Better City—Better Life'. In 2008 the Chinese government committed to hosting the Smoke-Free Beijing Olympic Games<sup>8</sup> which effectively promoted tobacco control efforts in China. Compared with holding the smoke-free Olympic Games, holding a smoke-free World Expo was potentially more difficult due to the longer duration, larger volume of visitors and larger areas to manage. In addition, there was no smoke-free precedent in the history of the Expo.

The Shanghai Public Places Smoking Control Regulations went into force on 1 March 2010.<sup>9</sup> This was the first provincial legislation on tobacco control in China and set the legal foundation for creating a smoke-free environment at the Expo. According to this legislation, smoking is totally prohibited in 13 kinds of public places such as medical institutions; inside and outside nurseries and kindergartens; primary and secondary schools; indoor public places for science, education, culture and art; and public transportation. However, the new legislation is still not a comprehensive public ban. For instance, no detailed standards were provided for restaurants and smoking zones were still permitted in restaurants and hotels. The Shanghai Expo Bureau adopted a series of measures that were much stricter than those in the tobacco control legislation to realise the goal of hosting a 'smoke-free Expo'. During the Expo, according to the tobacco control policy, all indoor public areas in the Expo would be 100% smoke-free. Outdoor smokers were directed to designated smoking areas only. Lighters were confiscated at the security posts at Expo venue entry gates in order to reduce the risk of fire as well as the possibility of violating the



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smoke-free policy. Smoking was allowed only in designated areas with fixed cigarette lighter machines. According to the agreement signed by the World Expo Bureau and several main telephone carriers in China, once the visitors went into the expo site they would automatically receive a series of texts on their telephone reminding them that smoking was allowed only in designated areas. In addition, hundreds of volunteers were on hand to remind visitors of the smoke-free policy, which was also reinforced by abundant signage and loudspeaker messages. The Tourism Bureau managed tobacco control training for tour guides and asked them to remind visitors of the smoke-free policies in the Expo. Even outside the Expo, tobacco control policies at the Expo were broadcast via mobile TV in various modes of public transport. Another important indication of the Shanghai government's determination to achieve a 'smoke-free Expo' was that, in 2009, the Shanghai Expo Bureau refused a 200 million Renminbi (RMB) donation (about 32 million US dollars) from the Shanghai tobacco industry.<sup>10</sup>

While considerable tobacco control efforts were made through multisectoral coordination, an evaluation was required to assess whether these policies were actually implemented and adhered to by visitors. The aim of the study was to examine the implementation of, adherence to and acceptability of the tobacco control policies at the Expo. This study provides an initial framework for evaluating smoke-free environments at large-scale events, a tobacco control strategy that will be more frequent in China and globally in the future.

## METHODS

A sequential cross-sectional study was conducted from July to October 2010. Methods included observations and an intercept survey. We conducted the investigation twice per month, covering both weekdays and weekends and sunny and rainy days. Based on the layout of the Expo, the Expo site was divided into five sections (designated A–E). At each assessment time, 10 research staff members (students from Fudan University) conducted the field study.

## Observations

Observations were conducted over a 4-month period, two visits per month, to cover different types of public places within the Expo. All pavilions and souvenir shops were observed (table 1). A random sample of restaurants was observed (51 of 119) and outdoor areas (n=27) were observed in all five sections of the

Expo. For each pavilion and souvenir shop, observation was conducted for 30 min. Observations entailed recording the average number of visitors, the occurrence of smoking, any sale/publicity of tobacco products and the number and position of non-smoking signs. Observations outside the pavilions were conducted in a similar way. In the above settings the observers behaved as visitors. Restaurants were observed during peak times with observers acting as customers. Previous pilot study findings indicated a higher occurrence of smoking in the outdoor non-smoking areas in the afternoon, so outdoor non-smoking areas were observed between 13.00 h and 15.00 h.

Observations involved recording the occurrence of smoking and the number of customers every 5 min in the 30 min observation time. A 5 min interval was used because most smokers would take about 5 min to smoke a cigarette. Using this interval, we aimed to minimise omission or duplication. In addition, if smoking was observed, selected characteristics of the people who were observed smoking were recorded (gender, clothing, age, including youth, middle-aged or elderly) to avoid double counting in the next observation interval. If the observed subject smoked more than one cigarette, each additional cigarette was counted as a separate occurrence. The prevalence of smoking was calculated as the number of total smoking occurrences in each observation phase divided by the average observed number of visitors in the observation period.

## Intercept surveys

The visitors' survey was conducted using a questionnaire covering each of the Expo sections and different age groups. The questionnaire was developed based on our experience in research and other smoke-free evaluation programmes<sup>11 12</sup> as well as the WHO guide to Tobacco-Free Mega Events.<sup>13</sup> Before the formal survey we conducted a pilot study among 30 visitors and made some adjustments. Considering the number of foreign visitors to the Expo, the Chinese version was translated into English and back-translated by two different bilingual persons to confirm consistency. All the interviewers were bilingual and underwent a 2 h training session.

Surveys were conducted from the afternoon to evening so that the visitors would have some experience within the Expo. The interviewers approached visitors during rest periods or while they were waiting in a queue. In total, 3022 questionnaires from visitors were gathered with a response rate of 73%. To avoid a clustering effect, only one visitor was surveyed in

**Table 1** Observation results in different public places (%)

	Proportion of settings with smoking occurrence	Proportion of observed smokers out of total visitors	Proportion of settings with sale of tobacco products	The proportion of settings with publicity of tobacco products	The proportion of settings with non-smoking signs
Pavilions (n=155, total=155)*	0	0	0	1.9	6.5
Queuing areas (n=155, total=155)*	3.8	0.2	0	0	5.8
Restaurants (n=51, total=119)*†	7.8	0.1	0	0	92.1
Souvenir shops (n=45, total=45)*	0	0	0	0	24
Outdoor non-smoking area (n=27)*	74.1	4.5	0	0	0

\*n refers to the number of observed samples; total refers to the total number of that kind of setting within the Expo area.

†Observation took place at the peak time.

each visiting group. Information included demographic data, smoking status, knowledge of and support for the tobacco control policies at the Expo and an assessment of implementation of the policies.

To measure visitors' understanding of tobacco control measures in the Expo, they were asked: 'Do you know that smoking is prohibited in the Shanghai Expo except in designated outdoor smoking areas?' If the answer was yes, they were asked, 'How do you know about this smoking control regulation?'. Response options were: (1) news in the media; (2) short message on the mobile phone; (3) large screen in the Expo; (4) broadcast in the Expo; or (5) staff and volunteers. Support for the smoke-free policy was evaluated by the following question: 'Do you support the current tobacco control policies at the Expo (smoking is prohibited except in designated outdoor smoking area)?' Response options were: (1) support; (2) neither support nor object; or (3) object. To understand visitors' assessments of implementation of the tobacco control policies we asked: 'What is your overall assessment of smoking control implementation at the Expo?' Response options were: (1) excellent, no one smoking in non-smoking areas; (2) good, only a few people smoking in non-smoking areas; or (3) not good, lots of people smoking in non-smoking areas. In addition, the following assessment was used to evaluate tobacco control attitudes among visitors: 'Every visitor has an obligation to follow the smoking control rules at the Expo'; 'If there is someone smoking in non-smoking areas, bystanders should stop the smoker'; 'Smoking at the Expo would damage the international image of Shanghai City'; and 'Smoke-free Expo can increase awareness of tobacco control in the public'. Response options ranged from agree to disagree on a 3-point Likert scale.

Data were analysed with SPSS V16.0. The Fisher exact test or  $\chi^2$  test was used to examine group differences by different months and different smoking statuses among the visitors.

## RESULTS

### Observation results

#### Inside pavilions

Observations were conducted at a total of 155 pavilions. No one was found smoking indoors. No-smoking signs were displayed inside 10 of the pavilions. Moreover, there were no tobacco displays, introductions or advertising inside any of the pavilions, except for the Cuba, Zimbabwe and Nicaraguan pavilions due to their special requests to exhibit tobacco for its cultural or agricultural importance. Therefore, almost all of the pavilions met tobacco-free standards which were developed by WHO, and no pavilions violated the smoke-free policy.<sup>13</sup>

#### Queuing areas outside pavilions

Only nine pavilions, including the Shanghai Group-General Motors Pavilion and the Spain Pavilion, clearly disseminated no-smoking information through large LCD/TV displays and stickers on the queuing aisles. Smoking was observed in six areas (3.8%) by 24 smokers (0.2%). Most smoking occurred in the long queues outside the large pavilions. These areas were not designated for smoking.

#### Restaurants

In 51 restaurants observed, 47 indoor restaurants had noticeable no-smoking signage (92.1%). Smoking was found in four restaurants (7.8%), which included two open-air restaurants. Smoking customers accounted for 1.0/1000 of the total customers. No tobacco sales, publicity or advertising of tobacco products was found in the restaurants.

#### Souvenir shops

There were 11 souvenir shops that displayed no-smoking signs (24%). There was no cigarette smoke, no smokers and no tobacco advertising or tobacco sales in any of the shops.

#### Outdoor non-smoking areas

Smokers were observed in 20 of the 27 outdoor no-smoking areas observed. During the total 810 min of observation we observed smoking among 4.5% of the total visitors. In addition, the prevalence of smokers observed among the visitors declined in September and October compared with July and August.

### Intercept survey results

Intercept surveys aimed to understand levels of awareness of tobacco control measures among visitors and to explore their satisfaction with implementation of the tobacco control measures. In all, 3022 questionnaires were gathered, with 42.8% from women. The average age was 30.3 years; 11.3% were aged <19 years, 37.9% were 20–29 years, 23.2% were 30–39 years, 15.8% were 40–49 years, 7.3% were 50–59 years and 4.3% were ≥60 years. In all, 17.2% were current smokers (36.8% among men and 0.9% among women). Typical education level was secondary (28.4%) or tertiary level (64.0%). Foreign visitors from 17 countries only accounted for 5.1% of the total participants; this figure was consistent with the proportion of overseas visitors reported in the Expo official website (5.8%).<sup>14</sup> The monthly numbers of respondents from July to October were 531, 410, 618 and 1403, respectively. The increase in participants in October was due to increased numbers of visitors when the Expo was near closing. There was no significant difference in the sex, age group, education level or smoking status among the visitors over time ( $p>0.05$ ).

Table 2 shows levels of knowledge and support for the tobacco control policies and an assessment of implementation of policies at the Expo. In all, 80.3% of visitors understood that smoking was prohibited in the Expo area. In addition, this proportion increased from 72.7% in July to 82.8% in October. News dissemination in the mass media was the main communication channel (63.6%), with the second being reminders from staff or volunteers (22.6%). Since the end of July, the Expo Bureau had been sending a short message to mobile telephones within the Expo area informing visitors of the tobacco control policies, which may have led to higher awareness of tobacco control policies over time. Overall, the policies were widely supported by the public (92.5%). As expected, non-smokers showed a higher level of support (98.8%) although, even among smokers, the support rate was 80.2%.

Visitors' assessment of implementation is an important indicator in evaluating the effect of tobacco control policies. The results showed that 53.4% of visitors regarded implementation as 'very good', 43.7% considered it as 'good' and only 2.9% reported that it was 'not satisfactory'. The proportion of 'very good' appraisals among visitors was highest in September when the average number of visitors was lower than in other months. Non-smokers had higher evaluation ratings than smokers, which was consistent with the trend of more non-smokers supporting the policy.

The Expo may have also promoted a 'smoke-free' social norm. Data showed that visitors generally agreed that the Smoke-free World Expo raised the visibility of smoke-free public places among the general public (91%) and promoted the process of civilisation (eg, progressive policies such as smoke-free public places) in Shanghai (90.3%). Visitors also indicated

**Table 2** Visitor knowledge, support and assessment of smoke-free policies at the Expo

	July (n=531)	August (n=410)	September (n=618)	October (n=1403)	p Value	Smokers (n=520)	Non-smokers (n=2502)	p Value	Total (n=3022)
Understand the Expo's smoke-free policy									
Yes	72.7	80.9	80.3	82.8	0.001	82.2	79.9	0.228	80.3
No	27.3	18.7	19.3	17.2		17.8	20.1		19.7
Support the Expo's smoke-free policy									
Support	93.2	91.2	92.9	92.6	0.24	80.2	95.1	<0.01	92.5
Neutral	4.4	7.1	5.2	4.6		14.9	3		5.0
Do not support	2.4	1.7	1.9	2.9		4.9	1.9		2.5
Assessment of tobacco control implementation at the Expo									
Excellent	54.1	52.7	61.6	50.7	0.001	42.5	55.8	<0.01	53.4
Good	42.9	45.5	36.1	45.8		55	41.2		43.7
Bad	3.0	1.7	2.3	3.5		2.5	3		2.9

that complying with the smoking regulations in the Expo was an obligation of each visitor (96.6%), and that everyone had the responsibility to discourage smoking (76.6%). No significant difference was found in these indicators over time. Although there were significant differences between smokers and non-smokers, the smokers generally showed positive attitudes towards tobacco control policies (table 3).

## DISCUSSION

The results of this study indicate a high level of implementation of, adherence to and acceptance of the smoke-free policy within the Shanghai World Expo. Visitors showed high awareness and support for the smoke-free policy and reported a high degree of satisfaction with the tobacco control policies at the Expo. The experience of the Expo provides evidence that a smoke-free environment is not just the privilege of a few developed countries. Within the Expo area, a densely populated region where there are 80 000 persons per square kilometre, creating smoke-free environments is still feasible, even in China with its relatively high smoking prevalence.

There was no sale or publicity of tobacco products in any of the public places within the Expo except in the the Cuba, Zimbabwe and Nicaragua pavilions in which tobacco was presented as part of their agricultural or cultural heritage. In general, we can conclude that pavilions, restaurants and souvenir shops were not only smoke-free but also tobacco-free. According to observation results, the smoking rate in the outdoor non-smoking areas was 4.5%, higher than the smoking rate in other public places at the Expo. However, it was notably lower than other public places outside the Expo site. During the same period we did a similar observation in the Nanjing Road area which was also densely populated. Research staff observed smoking occurrences twice on weekdays and weekends with the same methods applied in the Expo. The smoking occurrence ranged from 14% to 25%, which is much higher than that within the Expo. We did not validate our observations with butt counts, which have been applied in other studies,<sup>15</sup> because sanitation workers in the Expo cleared any cigarette butts immediately. No-smoking signs were generally not displayed either inside (6.5%) or outside (5.8%) the pavilions. There are several possible reasons for this. In some pavilions, staff may have given oral reminders at the entrance. Secondly, no-smoking signs may have negatively affected the overall layout or the aesthetic atmosphere of the pavilion.

Compared with the pavilions, restaurants—which were not covered by the municipal legislation—faced more difficulties.

The feasibility of having smoke-free restaurants in China has been questioned.<sup>16</sup> However, the results of this study indicate that smoking bans in restaurants can be successfully implemented with a high rate of compliance from visitors. The dissemination of smoke-free messages from the media, no-smoking signage in the restaurants, reminders from staff and fair strict enforcement of the ban all contributed to the smoke-free environments within restaurants.

At the end of October 2010 the WHO and China's Ministry of Health declared that the goal of a smoke-free Shanghai World Expo had been achieved.<sup>17</sup> The Shanghai World Expo not only provided the opportunity to experience a smoke-free environment for more than 70 million visitors, but also promoted a smoke-free norm among the general public. Findings indicated a high level of awareness of and support for the smoke-free policies at the Expo, which is consistent with observation results. Although lower than for non-smokers, smokers also reported a high level of support and a positive attitude towards tobacco control policies. In all, 92.5% of smokers agreed that 'smoking regulation in the Expo was the obligation of each visitor' and 78.4% of them agreed that 'illegal smoking damaged the image of Shanghai City'. These results indicate that smokers generally supported the smoke-free policy and that it may be feasible to implement large-scale smoke-free events, even in countries with a high smoking prevalence such as China.

During this 4-month study the results of the evaluation were provided to the Expo Bureau and Shanghai Health Promotion Committee every month, which led to continued adjustments and improvement of tobacco control measures during the Expo. From late July the Expo Bureau implemented a series of new measures: using text messages via mobile telephone to remind visitors about the tobacco control regulations, which led to increased awareness of such policy. In addition, the number of designated smoking areas was increased from 37 to 43. Also, the Expo Bureau placed some attractive signs for designated smoking areas for the convenience of visitors who smoked. In late September, designated smoking areas were redecorated with sunshades and benches. All of these measures may have had a positive impact on strengthening tobacco control measures. However, the proportion of visitors satisfied with tobacco control policies decreased in October. One possible reason is that the number of visitors greatly increased near the end of the Expo. The dense crowds may have made smokers more likely to smoke due to irritability and may also have led to declined overall satisfaction among visitors.



**Table 3** Visitor attitudes about the smoke-free Expo

	July (n=531)	August (n=410)	September (n=618)	October (n=1403)	p Value	Smokers (n=520)	Non-smokers (n=2502)	p Value	Total (n=3022)
Every visitor has an obligation to follow the Expo's tobacco control rules	96.4	97.0	97.1	96.2	0.57	92.5	97.4	<0.01	96.6
If there is a person smoking in non-smoking areas, bystanders should stop them	75.1	78.0	77.9	76.0	0.22	69.8	78.0	<0.01	76.6
Smoking in Expo influences the international image	87.9	86.4	87.4	85.9	0.37	78.4	88.4	<0.01	86.7
A smoke-free Expo increases awareness of tobacco control in the public	91.1	90.5	92.5	90.3	0.83	83.1	92.6	<0.01	91.0
A smoke-free Expo promotes Shanghai's civilisation	91.7	89.5	93.5	88.8	0.03	83.3	91.8	<0.01	90.3

There were some shortcomings in this study. The observations were conducted only once in each public setting and may not reflect the true status over time. Also, counting the number of smokers and visitors may have led to measurement bias. The face-to-face surveys may have led to visitors reporting more socially desirable responses indicating favourable attitudes toward tobacco control. In addition, the intercept survey among the visitors applied in this study may have caused selection bias. Lastly, objective measures such as PM<sub>2.5</sub> or nicotine levels were not adopted in this study due to time and resource constraints.

This is the first comprehensive study to evaluate the implementation of tobacco control policies in a worldwide large-scale event in China. This study can provide a foundation for evaluating tobacco-free and smoke-free large-scale events using mixed methods such as observations, intercept surveys and in-depth interviews (the latter were not included in this paper due to the scope of this paper). The evaluation assessed awareness and support for the regulations, and observation of compliance with the regulations in both indoor and outdoor public places. The tools developed in this study should be useful for evaluation of smoke-free and tobacco-free events in the future.

There was no precedent for a smoke-free World Expo. Thus, the 2010 Shanghai Expo was not only an international event attracting diverse cultures but also an opportunity to experience a smoke-free environment for millions of visitors. It has strengthened arguments about the feasibility of smoke-free large-scale events while developing comprehensive strategies for tobacco control which can be continued beyond the Expo. The smoke-free World Expo showed that tobacco control policies are widely

accepted and welcomed, and that China is capable of implementing major policies consistent with the spirit of the FCTC.

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**Patient consent** Obtained.

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## What this paper adds

- This is the first study using mixed methods to evaluate the implementation of tobacco control policies in a worldwide large-scale event in China.
- Commercial and business entities were highly adherent to the policies, suggesting that implementation and enforcement of smoke-free policies is feasible for large-scale events such as the World Expo.
- Visitors indicated a high level of support for the smoke-free policy and high adherence to the policy, further indicating the feasibility of implementing such a policy during large-scale, multi-cultural events.

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